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10   **METHOD AND APPARATUS FOR DISPLAYING TELEVISION**
PROGRAMS AND RELATED TEXT

Cross-Reference to Related Applications

This application is a continuation-in-part of
15   application Serial No. 08/312,863, filed September 27,
1994, which is a continuation-in-part of application
Serial No. 08/298,997, filed August 31, 1994. The
disclosures of these applications are incorporated fully
herein by reference.

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Background of the Invention

This invention relates to the field of television
and, more particularly, to a method and apparatus for
simultaneously displaying video programs and related text
25   on a television screen.

For a number of years television receivers have been
equipped with picture-in-picture (PIP) capability. In PIP
format, the moving, real time images of one television
channel are displayed on the background of the screen and
30   the moving, real time images of another television channel
are displayed in a PIP window overlaid on a small area of
the background. Because two channels are simultaneously
displayed by the television receiver, two tuners are
required. The viewer enters the PIP mode by pressing a
35   PIP key of his or her controller. Then, the viewer can
change either the channel of the background or the channel
of the PIP by resetting the appropriate tuner. To reverse

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1   the background and PIP images, the viewer simply presses
a SWAP key. To collapse the PIP window, the viewer again
presses the PIP key.

        Television program guides help television viewers
5   select programs to watch. Such television program guides
list the available television programs by day of the week,
time of day, channel, and program title. For many years
television program guides have been published in hard copy
form. More recently as illustrated by Levine Patent
10 4,908,713, television program guides have begun to take an
electronic form. In other words, the schedule of program
listings is stored in an electronic memory connected to
the television receiver. The program listings are
recalled from memory by the viewer on command for display
15 on the television screen.

        Despite the prevalence of television program guides,
many viewers still make their program selections by
switching the television tuner from channel to channel and
observing on the screen what program is being received on
20 the respective channels. This process is sometimes called
"grazing."

        Emanuel Patent 5,161,019 discloses an automated form
of channel grazing. A preselected group of channels are
sequentially scanned by switching the tuner of the
25 television receiver from channel to channel. A still
image of the program received on each channel is stored in
a memory. After all the channels have been scanned, the
still images from all the channels are simultaneously
displayed on the television screen. This process gives
30 the viewer more information about the program choices in
addition to that obtainable from a television program
guide, namely, the displayed still images of the actual
programs.

35 **Summary of the Invention**

        According to the invention, the moving images of a
television program are displayed in a PIP window on the

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1 screen of a television monitor and textual information
   related to the television program is displayed in the
   background on the screen. Preferably, the audio portion
   of the television program displayed in the PIP window is
5 also reproduced by the sound system of the television
   monitor. The textual information is arranged on the
   screen so none of it is covered by the moving images.
       In one embodiment, the textual program related
   information (PRI) is a television program schedule. One
10 of the program listings of the schedule identifies by
   title and time and/or channel the television program in
   the PIP window, which comprises moving images.
       To facilitate channel grazing, a television viewer
   can use a PIP format for display of current television
15 program listings from a program schedule data base in the
   background and moving, real time images of a program
   selected from the displayed listings in the PIP window.
   Specifically, as the viewer selects a particular program
   from the displayed current television program listings by
20 means of a cursor or a code number, the corresponding
   program automatically appears in the PIP window. In this
   way, the viewer can channel graze by sequentially
   selecting the individual program listings in the
   background. When the viewer finds a program that the
25 viewer wishes to watch, the viewer leaves the PIP format
   and returns to full screen television viewing, the tuner
   already being set to the desired program. To do this the
   viewer can reverse the background and PIP window and then
   collapse the window, leaving the desired program on the
30 full screen or apparatus can be configured to return to
   full screen viewing in a single step.
       To permit the viewing of programs scheduled for
   future broadcast without losing sight of the current
   program being watched, a television viewer can use a PIP
35 format for display of television program listings for a
   specific channel from a program schedule data base in the
   background and moving, real time images of the current

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program on that channel in the PIP window. Specifically, as the viewer changes channels, the current program on that channel automatically appears in the PIP window. The viewer can control the background to display program listings for a period of days, e.g. a week, in the future. In this way, the viewer can continue to watch a television program while ascertaining the future programs on the channel to which the television tuner is set. When the viewer finds a program that the viewer wishes to watch, the background disappears, leaving the program on the channel to which the tuner is set on the full screen.

In another embodiment, a television viewer can use a PIP format for display of future television program listings from a program schedule data base in the background and moving images of a video clip of one of the program listings in the background display selected for example by a cursor.

In yet another embodiment, the textual program related information (PRI) is a message that is broadcast in the vertical blanking interval of the television signal contemporaneously with the television program displayed in the PIP window.

Brief Description of the Drawings

The features of specific embodiments of the best mode contemplated of carrying out the invention are illustrated in the drawings, in which:

FIG. 1 is a schematic block diagram of a television receiver incorporating the principles of one embodiment of the invention;

FIGS. 2, 3, and 4 are television screens formatted in accordance with the embodiment of FIG. 1;

FIG. 5 is a schematic block diagram of part of a television receiver incorporating the principles of another embodiment of the invention;

FIGS. 6 and 7 are television screens formatted in accordance with the embodiment of FIG. 5; and

FIG. 8 is a television screen formatted to simulate a picture-in-picture window.

Detailed Description of a Specific Embodiment

In the following description of the embodiments of the invention, common reference numerals are used to represent the same components. If the features of all the embodiments are incorporated into a single system, these components can be shared and perform all the functions of the described embodiments.

In a preferred embodiment, the invention displays information about television program schedules and content in a tripartite electronic television program guide. One screen format is a time specific program guide (TISPG); another screen format is a channel specific program guide (CSPG); and the third screen format is a theme specific program guide (THSPG). In each case, the moving images of a currently broadcast television program are displayed in real time in a PIP window.

With reference to FIG. 1, a source of television signals 10 such as a terrestrial antenna, or a cable is connected to a television tuner 11. The output of tuner 11 is a modulated intermediate frequency signal containing video and audio television information. Tuner 11 is connected by an intermediate frequency amplifier (IF AMP) 12 to a picture detector (PICTURE DET) 13 and a sound detector (SOUND DET) 14, which produce base band video and audio signals, respectively. The audio signal is coupled by a sound amplifier (SOUND AMP) 15 to a loudspeaker 16. The video signal is coupled by a video amplifier not shown to one input of a switch 18. Sound detector 14 and picture detector 13 are connected to the audio and video inputs, respectively, of a video cassette recorder (VCR) 17. (Alternatively, television signal source 10 could be directly connected to the RF input of VCR 17, if its internal tuner and demodulating circuitry is to be utilized.) The output of VCR 17 is connected to the other input of switch 18. The output of switch 18 is connected to one input of a conventional picture-in-picture (PIP) integrated circuit chip 19. The output of PIP chip 19 is

connected to the video input of a television receiver or monitor (TV) 20 having a screen (not shown).

An updatable data base of the schedule of program listings of all the available channels for a prescribed period of time, e.g. a day or a week, is electronically stored in a program schedule memory 22. These program listings typically include for each program the title, a program description, the day of the week, the start time of the day, the program length, and the channel on which the program is transmitted and thus available for reception at source 10. In a preferred embodiment of the invention, the period of time for which the program listings are stored is different for the guides, depending upon viewer priorities and preferences. For example, the information needed to display the TISPG and CSPG may be stored for one or two days and the information needed to display the TSPG may be stored for a week or more. The data base can be updated by a continuous data link in the vertical blanking interval (VBI) of one television channel broadcast to the television receiver in well known fashion. Alternatively, the data base can be updated by unplugging memory 22 and replacing it with a memory having the updated data base. Memory 22 is connected to a microprocessor 24 that is programmed to control the operation of the described equipment. An operating program for microprocessor 24 is stored in a read only memory (ROM) 26. A viewer input device 28, preferably in the form of a remote IR controller, is coupled to microprocessor 24 to provide commands from the viewer. A video processor 30 is coupled to microprocessor 24. When the viewer wishes to see television program listings, microprocessor 24 recalls a portion of the program schedule data base from memory 22 and couples it to video processor 30, where the program listings are formatted for display. Preferably, the information stored in video processor 30 is a bit map of what is displayed on the screen of television receiver 20. Video processor 30 is

connected to the other input of PIP chip 19. Preferably, input device 28 controls microprocessor 24 by cursor movement on the screen of television receiver 20. To this end, microprocessor 24 and video processor 30 are coupled to a cursor position register 32. (Alternatively, the viewer can select items of information displayed on the screen by keying into viewer input device 24 code numbers assigned to these items.) Microprocessor 24 is also coupled to tuner 12 for channel change, to VCR 16 for play/record selection and start/stop, to switch 18 for selection of one of its inputs, and to PIP chip 1 for selection of the mode of PIP operation.

The formats of the electronic program guide are shown in FIGS. 2 to 5. Each format has a background area 40 and an overlayed PIP window 42 in the upper left-hand corner of the screen. The real time, i.e., 6:15 p.m., is displayed in a sub-area 42a of PIP window 42. Background area 40 includes a banner and message prompting area 43 at the top of the screen, a program description area 44 in the upper right-hand corner of the screen adjacent to PIP window 42, and a program schedule area 46 below areas 42 and 44. Program description area 44 includes the start time and length (duration) of the program being described. The viewer can move a cursor 48 vertically to highlight one of the program listings displayed in area 46. The highlighted background of cursor 48 and the background of program description area 44 are the same color or shade. In each format, the moving images of a currently broadcast television program in real time and the current time are displayed in PIP window 42 and the audio portion of the television program displayed in PIP window 42 is reproduced by the sound system of monitor 20. The information displayed in areas 43, 44, and 46 varies depending upon the format.

One version of the TISPG screen format is shown in FIG. 2, namely a version that displays program listings of television programs being broadcast at the current time.

Program schedule area 46 has a column for channel name or call letters, a column for channel number, and a column for program title; each line of area 46 represents a separate program listing. The moving, real time images of the current television program highlighted by cursor 48 are displayed in PIP window 42 and a brief program description of the highlighted program is displayed in area 44.

In FIG. 3 another version of the TISPG screen format displays in area 46 program listings being broadcast at a future time, i.e., 8:00 p.m. The viewer can select the future time of the program listings to be displayed at intervals such as one-half hour. The selected future time, i.e., 8:00 p.m., for the program listings displayed in area 46 is shown in a sub-area 43a of area 43. A brief program description of the program listing highlighted in area 46 by cursor 48 is displayed in area 44. The current program being broadcast remains displayed in PIP window 42, and a banner 49 which identifies the current program by channel name, channel number, and program title is displayed between PIP window 42 and area 46 on a background having a different color or shade than cursor 48.

In FIG. 4, the CSPG screen format is shown. All the program listings for a selected channel, i.e., FOX Channel 7, are displayed in area 46, from the currently broadcast program into the future for a specified time period, e.g., 24 hours or until the end of the next day. Area 46 has a column for time and a column for program title; each line of area 46 represents a separate program listing. The moving, real time images of the current television program are displayed in PIP window 42. If the cursor also highlights the current program, a brief program description of the current program is displayed in area 44. If the cursor highlights another program listing, as shown in FIG. 3, a brief program description of the highlighted program is displayed in area 44 and the

current program is identified in banner 49 by time and title.

In FIG. 5, the THSPG screen format is shown. The program listings for a selected theme or subtheme, i.e., ALL MOVIES, are displayed in area 46, from the next broadcast program into the future for a specified time period, e.g., one week. Area 46 has a heading 46a that identifies the theme or subtheme, date, and day, i.e., ALL MOVIES DEC 12 MON, a column for title, a column for start time, and a column for channel name or number; each line of area 46 represents a separate program listing. The moving, real time images of the current television program are displayed in PIP window 42 and the current program is identified in banner 49 by channel name or number and title. A brief program description of the program highlighted by cursor 48 is displayed in area 44.

All four areas of background 40 are formatted in video processor 30. The memory space of video processor 30 corresponding to the area in which PIP window 42 appears on the screen is left blank; i.e., although overlaid on background area 40, PIP window 42 does not cover up any of the information of background area 40. By means of a pair of up/down arrows on input control device 28, the viewer can move a cursor 48 vertically to highlight the listing of one of the currently playing television programs displayed in area 46. Preferably, to reduce delays in displaying the program schedules, all the program listings for the particular screen format are stored in video processor 30, even though only a fraction of them are displayed at the same time. When the cursor reaches the top or bottom listing in area 46, microprocessor 24 recalls further program listings from video processor 30 for display on the screen of television receiver 20.

In all the formats, the moving, real time images of the current television program highlighted by cursor 48 are displayed in PIP window 42, the program description of

the highlighted program is displayed in area 44, program listings of one type or another are displayed in area 46, and one or more prompts are displayed in banner area 43 as described in more detail below. The audio portion of the television program displayed in PIP window 42 is reproduced by the sound system of monitor 20. The PIP display, the sound reproduction, and the program description in area 44 enable the viewer to assess better whether or not to watch the highlighted program. As the viewer moves cursor 48 vertically from program listing to program listing, the current television program displayed in window 42 and the program description displayed in area 44 automatically change accordingly to match the highlighted program in area 46. As the cursor moves from one program listing to another, tuner 12 is set to the channel for the highlighted program listing so the program can be displayed in PIP window 42, microprocessor 24 recalls the program description for the highlighted listing from program schedule memory 22, and video processor 30 formats this program description so it can be displayed in area 44.

Preferably, two levels of detail are available for the program description. Normally, the first level detail of the program description is displayed in area 44 as described above. When more detail is desired, the viewer operates input device 28 to display an second level detail of the program description. There are two options for the display of the second level detail. As one option, the second level detail can replace the first level detail in area 44. This has the advantage that the program listings can continue to be seen by the viewer while more detail about the program description is displayed. As the other option, the second level detail can replace the program listings in area 46. This has the advantage that more space is available to display the second level of detail than the first level.

1   Reference is made to FIGS. 6 to 13 for a description
of the steps taken by a user to navigate about the
preferred embodiment of the television program guide.
Viewer input device 28 preferably takes the form of a
5   hand-held remote infrared (IR) transmitter which
communicates with an infrared receiver connected to
microprocessor 24. As shown in FIG. 6, the IR transmitter
has a housing 50 on which a number of control buttons are
mounted. A GUIDE/TV button 52, an INFO button 54, and a
10   VCR PLUS+ button 56 are located above up and down arrow
buttons 58 and 60. A row of buttons 62, 64, 66 and 68
which marked with the colors red (R), green (G), yellow
(Y), and blue (B), respectively, underlie down arrow
button 60. Red, green, yellow, and blue prompts are
15   displayed in area 43 of the electronic guides. To select
a prompt on the screen, the button of the IR transmitter
having the corresponding color is pressed, i.e., to select
the blue prompt on the screen, blue button 68 is pressed.
           The screen formats and the links between the
20   individual guides are designed with two objectives in
mind--first, always to display the program the viewer was
watching before entering the electronic guide and second,
never to leave the electronic guide while navigating
through it, until the viewer returns to the TV mode. As
25   described below, the guides are linked to each other in a
one way hierarchy that are accessed by on screen prompts
color coded to the buttons on the remote control
transmitter. At each level of the hierarchy, the view has
the choice of returning to a backbone guide, or moving
30   down to a guide at a lower level in the hierarchy. At the
lowest level, the only choice is to return to the backbone
guide.
           As represented in FIG. 7 by a box 70, the viewer
enters the electronic guide by pressing GUIDE/TV button 52
35   on the remote controller. As represented by a box 72, the
so-called "NOW" guide is then displayed on the screen.

This is the "backbone" of the electronic guide in that it is the starting point for entry into each other guide.

As represented by a box 74 in each of FIGS. 8 to 13, the user may cursor up and down the program listings in area 46 to select a particular program. As represented by a box 76 in each of FIGS. 8 to 13, the user presses GUIDE/TV button 52 to return to the full screen TV mode and presses INFO button 54 to display the second level detail of the program information in area 44 or area 46.

In FIG. 7 a box 80 depicts the layout of the NOW guide, which is a version of the TISPG screen format. Area 43 has a blue "CHOICE" prompt and a banner that identifies the format as the "NOW" format and displays the date, day, and time. When the viewer presses blue button 68 on the remote controller (FIG. 6), as represented by a block 82, four prompting choices are presented to the viewer. As represented by a block 84 in FIG. 8, these prompting choices are displayed in an "ALL CHANNEL" guide.

Block 86 represents the "ALL CHANNEL" guide, which is identical to the "NOW" guide except for area 43. This is a transition guide in that it permits the viewer to enter other guides at a lower level of the hierarchy by following the displayed prompts. In the "ALL CHANNEL" guide, a red NOW prompt, a green CSPG prompt, a yellow NEXT prompt, and a blue SORT prompt are displayed. As represented by a box 88, in each of the guides of FIGS. 8 to 14, a return to the NOW guide of FIG. 7 occurs when the viewer presses red button 62 on the remote control transmitter.

As represented by a box 92 in FIG. 9, when green button 64 is pressed from the ALL CHANNEL guide, a "THIS CHANNEL" guide in the CSPG format described above is displayed. A box 94 depicts the THIS CHANNEL guide, which is at the bottom of the hierarchy. So, only one prompt is displayed in area 43, namely the red NOW prompt, which permits the viewer to return to the NOW guide. Area 43

1   also displays the name and channel number of the specific
        channel, e.g. ABC, Channel 7.

            As represented by a box 96 in FIG. 8 and a box 98 in
        FIG. 10, to display a "NEXT" guide, the viewer presses
5   yellow button 66 on the remote control transmitter. The
        NEXT guide, which has CSPG format for a future time, is
        depicted by a box 100. Area 43 in the NEXT guide has in
        addition to the red NOW prompt, a green up arrow prompt,
        and a blue down arrow prompt. Area 43 also displays the
10   future time at which the listed programs are broadcast.
        When the viewer presses green button 64, the programs
        being broadcast at a one-half earlier time are displayed,
        as represented by a box 102. When the viewer presses blue
        button 68, programs broadcast at a one-half hour later
15   time are displayed as represented by a box 104.

            As represented by a box 105 in FIG. 8 and a box 106
        in FIG. 11, screen one of a "SORT" guide is displayed when
        the viewer presses blue button 68 in the ALL CHANNEL
        guide.   The SORT guide is in the THSPG screen format
20   described above. As depicted by a box 108, in addition to
        the red NOW prompt, a green MOVIES prompt, a yellow SPORTS
        prompt, and a blue OTHERS prompt are displayed in area 43.
        Screen one of the SORT guide is displayed in area 46. In
        screen one of the SORT guide, when the viewer presses
25   green button 64, screen one of an "ALL MOVIES" guide is
        displayed as represented by a box 112 in FIG. 12. Screen
        one of the ALL MOVIES guide is represented graphically in
        a box 114.   In addition to the red NOW prompt, a green
        ACTION prompt, a yellow COMEDY prompt and a blue OTHER
30   prompt are displayed in area 43. When the viewer presses
        green button 64, an ACTION MOVIE guide is displayed. When
        the viewer presses yellow button 66, a COMEDY MOVIES guide
        is displayed in area 46. When blue button 68 is pressed,
        as represented by a box 120 in FIG. 12 and a box 122 in
35   FIG. 13, screen two of an all movies guide is displayed.
        As represented graphically by a box 124, when screen two
        of the ALL MOVIES guide is displayed, in addition to the

red NOW prompt a green DRAMA prompt, the yellow HORROR prompt and a blue ALL OTHERS prompt is displayed. Instead of an ALL MOVIES guide, a screen three ALL MOVIES could be displayed if more theme subcategories are desired. The only difference between screen one and screen two of the ALL MOVIES guide is that the prompts are in area 43. The reason for multiple screens in the ALL MOVIES guide is to provide a number of prompts in area 43 of the screens to display all the subcategories of the particular category, i.e., movies. In the ALL MOVIES guide, the sum of the ALL MOVIES in the subcategories are displayed (mention another subcategory as ALL OTHER movies).

As represented in FIGS. 11 and 14, when the user presses blue prompt button 68 from screen one of the SORT guide, screen two of the SORT guide is displayed. As depicted graphically by box 132, in addition to the red NOW prompt, a green CHILD prompt, a yellow SPECIAL and a blue SERIES prompt are displayed in area 43. When the viewer presses green button 64, an ALL CHILDREN's guide is displayed as represented by a box 34. When the viewer presses white button 166, an ALL SPECIAL guide is displayed as represented by a box 136. When the viewer presses blue button 68, an ALL SERIES guide is displayed as represented by a box 138. Although not depicted in the drawings, the ALL SPORT, ALL CHILDREN, ALL SPECIAL, ALL SERIES action movies, comedy movies, drama movies, horror movies and all other movies guides each contain program listings classified in the category or subcategory corresponding to the guide name. Since these guides are of the lowest level of the hierarchy, the only prompt played in area 43 is the red NOW prompt, which returns the viewer to the backbone guide. (note to LTR, state that the other categories could also be broken into subcategories as with the movies).

As described in more detail below, in program schedule memory 22, the program listings are coded by day of the week, time of day, and channel so that they can be

1   accessed by microprocessor 24 when necessary to supply
     program schedule information to video processor 30 to
     compose the program listings and the program descriptions.
     Microprocessor 24 has a real time clock (not shown), the
5   time of which is compared with the time of day and day of
     the week codes to select the program listings for the
     TISPG mode.   The functional storage areas of cursor
     position register 32 are mapped to the storage areas of
     vector processor 30 where the program schedule is
10   formatted for display on screen area 40 so cursor position
     register 32 points to the area of the screen, and thus the
     particular program, that is highlighted by cursor 48. By
     comparing the cursor position in register 32 with the
     channel corresponding to the highlighted area of video
15   processor 30, the channel of the highlighted program is
     derived and coupled to microprocessor 24. Microprocessor
     24 then sets tuner 12 to this channel.
          In TISPG operation, microprocessor 24 recalls the
     appropriate program listings from memory 22 and transmits
20   them to video processor 30 where the program listings of
     area 46 and the program description of the highlighted
     program in area 44 are composed.   At the same time,
     microprocessor 24 operates switch 18 so the output of
     tuner 12 is directly connected to the one input of PIP
25   chip 19 and switches PIP chip 19 into a PIP mode, such
     that the input from tuner 12 is displayed in the PIP
     window and the program schedule from video processor 30 is
     displayed in the background. Microprocessor 24 senses the
     channel to which the tuner is set when the TISPG mode is
30   entered, and initially positions cursor 48 at the program
     listing broadcast on this channel. As the viewer moves
     the up/down arrows of the cursor control key set, tuner 12
     is reset accordingly and new program schedule information
     is fed through microprocessor 24 to video processor 30 to
35   recompose the program listings so cursor 48 remains
     visible and the program description remains current. The
     described TISPG mode facilitates channel grazing by the

viewer. When the viewer finds the video program he or she wishes to watch, the viewer leaves the TISPG mode. As a result, microprocessor 24 switches PIP chip 19 out of the PIP mode, such that the video program inputted from tuner 12 is displayed full screen.

If the viewer wishes to record the program highlighted in the TISPG mode, the viewer commands microprocessor 24 to turn on VCR 16 for recording.

If the viewer wishes to play a video tape cassette on VCR 16, the viewer commands microprocessor 24 to turn on VCR for playback and to operate switch 18 for connection of the output of VCR 16 through PIP chip 19 to television receiver 20.

The television receiver of FIG. 1 can also be used with the format of FIGS. 3 or 4 in an extension of the CSPG mode to display previews of future programming as video clips. The video clips are stored on a video tape cassette that is loaded into VCR 16. The addresses of the video clips on the tape of the video cassette are stored in program schedule memory 22 as part of the data base. These addresses are linked to the respective future program listings in the data base so that a video clip can be accessed on the tape when a program listing is designated in the database. When the viewer presses the CSPG mode key, in addition to the operation as described in connection with FIG. 3, microprocessor 24 highlights the current program title with cursor 48, as illustrated in FIG. 3. So long as cursor 48 highlights the title of the current program, the CSPG mode operates as described above. When the viewer moves cursor 48 vertically by operating the cursor control key set on input device 28 to highlight the title of a future program displayed in area 50, the address of the video clip of the highlighted program listing is retrieved by microprocessor 24 from program schedule memory 22 and transmitted to VCR 16. The video clip is retrieved from the tape in VCR 16 and coupled through switch 18 and PPI chip 19 to television

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receiver 24 for display in PIP window 42. The video clips on the tape of the videocassette are indexed and accessed in the manner described in co-pending application Serial No. 08/176,852, filed on December 30, 1993 and entitled ENHANCING OPERATIONS OF VIDEOTAPE CASSETTE PLAYERS, the disclosure of which is incorporated fully herein by reference.

An extension of the TISPG mode illustrated in FIG. 2 also permits display of video clips of future programming. Specifically, in the time-channel grid format microprocessor 24 also controls cursor 48 responsive to the cursor key set of viewer input device 28, which in this embodiment includes a horizontal cursor control, such as a pair of right/left arrows. As described above, the address for the highlighted future program listing is retrieved by microprocessor 24 from program schedule memory 22 and transmitted to VCR 16 to access the corresponding video clip, which is displayed in PIP window 42.

Another embodiment in which video clips can be displayed in PIP window 42 is illustrated in FIG. 4. In addition to banner area 43 and program description area 44, background area 40 has program schedule area 52, in which program listings are displayed by theme such as movies, sports, current events, etc. Area 52 contains a column for program start time, a column for program channel, and a column for program title. To implement this embodiment, the program listings of the data base stored in program schedule memory 22 are also coded by theme so that they can be accessed by microprocessor 24 in response to the viewer selection of themes from an on-screen menu in well known fashion. As described in connection with the extended TISPG and CSPG modes described above, when the title of a future program listing is highlighted by cursor 48, the corresponding moving image video clip is displayed in PIP window 42. If desired, a video disc player could be substituted for VCR 16 to provide the

1   video clips to switch 18 in order to speed up the access time to the moving images displayed in PIP window 42.

        In another embodiment, program related information (PRI) is displayed in background area 40 while the real

5   time television program to which the PRI relates is displayed in PIP window 42. The PRI is transmitted in the vertical blanking interval (VBI) of the television signal of the channel carrying the television program to which the PRI relates, contemporaneously with this television

10   program. As illustrated in FIG. 15, to implement this embodiment a VBI decoder 54 is connected between the output of tuner 12 and microprocessor 24 and a PRI memory 56 is connected to microprocessor 24. The PRI is stripped from the VBI of the television signal by decoder 54 and

15   stored in memory 56 by microprocessor 24.

        In operation, when the viewer presses a PRI key on viewer input device 28 the real time television program of the channel to which tuner 12 is set is displayed in PIP window 42. In addition to banner area 43 and program

20   description area 44, background area 40 has a PRI area 58 in which different types of PRI are displayed. In FIG. 16 the real time television program is a cooking demonstration by Julia Child and the PRI displayed in area 58 is a recipe made in the course of the demonstration.

25   Other information about the program is displayed in area 44. In FIG. 17 the real time television program is a commercial for Lexus automobiles and the PRI displayed in area 58 is a test drive offer for Lexus. The name and address of the local Lexus dealer in the geographic area

30   of the viewer is displayed in area 44.

        As illustrated in FIG. 18, if the viewer does not have a television receiver with a PIP chip, the same screen format is still displayed in the TISPG, CSPG and PRI modes. Text composed in video processor 30 is

35   displayed in PIP window 42 instead of moving real time or video clip images. For example, in any of the described modes the displayed information could be locally derived,

1   such as time of day, or received in the VBI, such as
     weather, traffic, or news headlines.

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